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PHILIPS ELECTRONICS NORTH AMERICA CORPORATION

DISCLOSURE OF INVENTION

THIS DESCRIPTION SHOULD BE SUPPLEMENTED BY ATTACHING COPIES OF RELEVANT DOCUMENTS, SUCH AS PUBLISHED ARTICLES OR PATENTS, PRODUCT BROCHURES, ENGINEERING NOTEBOOK PAGES AND DRAWINGS.

DESCRIPTIVE TITLE OF THE INVENTION: A "self" collaborative recommender system to account for non-stationary user preferences.

1. **INVENTOR #1:** Kaushal Kurapati
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   INVENTOR #2

   INVENTOR #3:

8 MAR 00 10: 03

2. **PRIMARY CONTACT**
   If more than one inventor is named above, who will have the primary responsibilities for communicating with Philips Intellectual Property Department with respect to technical information about the invention and usage of the invention?

   Inventor Name: Kaushal Kurapati

3. **PRESENT STAGE OF THE INVENTION**
   ☒ Idea   ☐ Research   ☐ Development   ☐ Manufacture

4. **GOVERNMENT CONTRACT INVENTION**
   Was the invention made under a government contract?   ☐ Yes   ☒ No

5. PRESENT STATE OF THE ART
Briefly describe the closest already-known technology that relates to the invention. This would include, for example, already existing products, methods or compositions which are known to you personally or through descriptions in publications.

This invention falls in the area of recommender systems. Current TV recommender systems, using the Bayesian and decision tree techniques (Philips is seeking patents for these technologies currently), build viewing histories of users and generate a profile for users based on that. The recommender engine takes a user profile as input and generates recommendation scores for TV shows as output.

6. ADVANCEMENT IN STATE OF THE ART
Briefly describe the unique advancement achieved by the invention. This may be done, for example, by describing a problem with the prior art that is solved or specific objects that are achieved by the invention.

The problem with the state-of-the-art systems is that a change in the TV viewer's viewing preferences is not spotted easily by the recommender engines. This is the problem of 'non-stationary viewing preferences'. One other problem is that of determining which view history to delete from memory. If viewer's preferences do not change much over time, old view history can be deleted without loss of any performance in the recommendations. But, how does one know if the viewer's preferences have changed? This invention is a solution to that problem.

This invention envisions a recommender framework which uses an existing recommendation engine and primarily addresses the issue of catering to changing viewer preferences.

7. HOW ACHIEVED
Briefly describe the invention and how it achieves the advancement described in paragraph 6.

The state-of-the-art recommender systems consider a person's view history as a whole to generate the viewer profile and the recommendation scores; the current invention considers the view history in parts and generates multiple user profiles for a single person. The view history is a collection of TV shows watched and not-watched over a period of time. This invention considers sub-sets of the entire view history where each sub-set of TV shows are selected by either of the following methods:
- A uniformly randomly sampled sub-set of TV shows from the entire view history
- A sub-set might correspond to a time-span which is less than the entire time period that the view history spans

For each sub-set of view history, the system builds a user-profile and generates recommendation scores using an existing recommendation engine. Consider 2 view history sub-sets, V1 and V2, generated using method 2 above. Let them belong to time spans T1 and T2 respectively. Assume, for convenience sake that T1 and T2 are non-overlapping (they need not be, in general). If a viewer changed his/her viewing preferences from T1 to T2, the shows corresponding to the new preferences show up in T2. Using V1 and V2, the recommendation engine generates two sets of recommendation

scores for a particular day. Consider the top N (a variable > 0) shows in a certain time period of the day. Call the respective top-N TV show sets S1 and S2. There are three possibilities regarding shows in S1 and S2:

- If shows in S1 = shows in S2, then the viewers' preferences have not changed at all or at least not substantially so that the recommender can perceive the difference. In this case, the view history which is old (V1 in our example) can be thrown away and memory savings can be achieved.
- If S1 and S2 have a non-zero number of shows in common, then the system has identified the common thread and has also spotted some new preferences that the user has developed.
- The final possibility is that S1 and S2 have no shows in common at all. This prospect implies that the user's preferences have changed completely between the two time periods chosen. The reason could be anything: may be it is the holiday season and the type of TV programming has changed; this invention allows the recommender to spot the change.

In cases 2 and 3 above, the user can be shown those recommendations which correspond to a time period closest to the current time period (the time he/she is requesting the recommendations for). Another option is to present the user with all the shows in S1 and S2 (with repetitions removed).

Thus, this framework uses ideas of collaborative filtering, but applies it to a single user scenario, which has not been done before. The collaboration, in this case, comes from combining the sets of recommendations S1 and S2 for a single user and presenting options which combine his/her preferences from different time periods.

8. **DISCLOSURE OUTSIDE OF PHILIPS**
   If the invention has been or will be disclosed to anyone other than a Philips' employee, describe to whom (person / company), when and where.
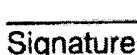
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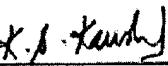
9. INVENTOR #1: ___K.J. Kaushal_____ ▮▮▮▮▮▮▮_____
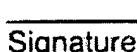   Signature   Date

   INVENTOR #2: _____ _____
                 Signature   Date

   INVENTOR #3: _____ _____
                 Signature   Date